Medical Effects of Stress on the Body

Presented by:
Karen Seward, President
Ben Morton, Vice President, Clinical Services
OBJECTIVES

Understand stress and its manifestations physically and mentally

Clinical Consequences to stress – metabolic and mechanical

How to manage stress in the workplace and build a more resilient workplace

Impact of stress on work activity
“Resiliency is the process of adapting well in the face of adversity, trauma, tragedy, threats and stress”

**Stress can be:**
- relationship problems
- serious health problems
- workplace/financial stress

Resilience is **ability** bouncing back from difficult experiences
LIFE CAN CHANGE IN A MOMENT…

…when it does do you have the:

- Information
- Skills
- Support

To minimize impact on your life and others?
ITS ABOUT OUR OWN GPS...

**How do we know…?**

- Where we should be going
- Are we in the right direction
Top 3 drivers for STD claims in Canada:

- Mental health
- Musculoskeletal/back issues
- Accidents

Top 3 drivers for LTD claims in Canada:

- Mental health
- Musculoskeletal/back issues
- Cancer

Work related Ill health study:

- Musculoskeletal and psychological ill-health were rarely referred to secondary care
- Skin and respiratory cases were referred more often

"About 10% of workers have a mental health condition, and mental health issues represent one-third of all short-term disability (STD) and long-term disability (LTD) claims. They also account for 70% of STD and LTD costs"

"…a mental health claim can last 65 days and cost $18,000, on average."


Plan Members Need:

- Clarification of the diagnosis at onset – early intervention
- Identification of treatment options and a return to function plan
- Focus on cost avoidance (eg. Drug Costs)
WHAT IS THE ROLE OF RESILIENCY IN WORKPLACE?

When we hire someone we screen for factors that enable us to evaluate the fit of an individual for a role.

- Experience
- Competency
...BUT WE DON’T
OFTEN SCREEN FOR RESILIENCY
RESILIENCY - HIERARCHY OF NEEDS

- Ability to cope with stress and adversity
- Ability to interact with environment and processes that promote well being

Teachable moments

- Ability to take action
- Self Esteem, Self Confidence
- Problem Solving Skills And Solutions
- Ability to manage health and well being
FACTORS IMPACTING HEALTH AND PRODUCTIVITY OF EMPLOYEES

Social Determinants
- Genetics
- Life Conditions
- Physical Environment

Individual Response
- Care Experience
- Health Promotion
- Quality and appropriate health services
- Patient Experience
- Efficiency and effectiveness

Access to Comprehensive Integrated Health Services
1. **Stress: Definition**

2. Biopsychosocial models of stress effects

3. Clinical consequences of stress – metabolic and mechanical

4. Applications of stress to common workplace scenarios (email stress, rotational shift work)
https://www.surveymonkey.com/r/QD9VN95
“It's not what happens to you, but how you react to it that matters” (Epictetus)

“The non-specific response of the body to any demand for change” (Hans Selye, 1936)

Stress is a condition or feeling experienced when a person perceives that "demands exceed the personal and social resources the individual is able to mobilize.” (Richard S.Lazarus)

“…we define stress as environmental conditions that require behavioral adjustment” (Benson, H. The Relaxation Response, 2000, pg. 41).

“Thus, change, good or bad, can induce a stress response.” (Holmes and Rahe – Life Events Rating Scale)
• Stress occurs when you have to handle more than you are used to

• When you are stressed, your body responds as though you are in danger
  
  o Hormones are produced that speed up your heart, make you breathe faster, and give you a burst of energy
  
  o The fight-or-flight stress response

• Some stress is normal and even useful (need to work hard or react quickly)
STRESS: ACUTE VS. CHRONIC

Acute (short-term) stress:

- The body's instant response to any situation that seems demanding or dangerous.
- Stress level depends on how intense the stress is, how long it lasts, and how one copes with the situation.
- The body normally recovers quickly from acute stress.
- Problems occur if it happens too often or if the body doesn't have a chance to recover.
- In individuals with cardiac conditions, acute stress can trigger an arrhythmia or heart attack.

Chronic (long-term) stress:

- Caused by stressful situations or events that last over a long period of time.
- Examples include a difficult job or dealing with a chronic disease.
- Any pre-existing health issues can be made worse with stress.
THE STRESS RESPONSE: ABILITY AND DEMANDS

Goleman (2006) Social Intelligence, the new science of human relationships, Random House
http://drmichellecleere.com/2012/mental-moment-is-all-stress-bad
<table>
<thead>
<tr>
<th>Event</th>
<th>Score</th>
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<tbody>
<tr>
<td>Death of Spouse</td>
<td>100</td>
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<tr>
<td>Divorce</td>
<td>73</td>
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<tr>
<td>Jail term</td>
<td>63</td>
</tr>
<tr>
<td>Death of close family member</td>
<td>63</td>
</tr>
<tr>
<td>Marriage</td>
<td>50</td>
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<tr>
<td>Fired at work</td>
<td>47</td>
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<tr>
<td>Retirement</td>
<td>47</td>
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<tr>
<td>Gain of a new family member</td>
<td>39</td>
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<tr>
<td>Large mortgage or loan</td>
<td>31</td>
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<tr>
<td>Trouble with boss</td>
<td>23</td>
</tr>
<tr>
<td>Change in residence</td>
<td>20</td>
</tr>
<tr>
<td>Vacation</td>
<td>13</td>
</tr>
<tr>
<td>Christmas</td>
<td>12</td>
</tr>
<tr>
<td>Minor violations of law</td>
<td>11</td>
</tr>
</tbody>
</table>


http://www.mindtools.com/pages/article/newTCS_82.htm
STRESS AND ILLNESS IN PRIMARY CARE PRACTICE

- Review of audiotapes of primary care practice of patients with ‘chronic-disease’
- 439 interactions with 49 physicians
- Stress was by far the most time consuming topic.
- Nearly 60% of the discussions were attempts to counsel or encourage behavior change in the patient.
- Estimated that 70-80% of primary care visits involve an illness that is caused or augmented by stress

MEDICAL EFFECTS OF STRESS ON THE BODY

1. Stress: Definition
2. Biopsychosocial models of stress effects
3. Clinical consequences of stress – metabolic and mechanical
4. Applications of stress to common workplace scenarios (email stress, rotational shift work)
STRESS EFFECTS

https://www.youtube.com/watch?v=mtRrxNTnyh8
THE STRESS RESPONSE

Stressful event → Hypothalamus → Amygdala → Fight or flight

The diagram illustrates the relationship between stressors and the body's stress response system. The stressors stimulate the hypothalamus, which in turn release CRH and GHRH, leading to the release of ACTH, hGH, and TSH from the anterior pituitary gland.

The CRH and GHRH stimulate the adrenal medulla to release epinephrine and norepinephrine, which further enhance the body's stress response. The sympathetic nervous system also plays a role, with impulses reaching the adrenal medulla and sympathetic centers in the spinal cord.

The stress responses are categorized into two main types: (a) Fight-or-flight responses and (b) Resistance reaction.

**Fight-or-flight responses**:
1. Increased heart rate and force of beat
2. Constriction of blood vessels of most viscera and skin
3. Dilation of blood vessels of heart, lungs, brain, and skeletal muscles
4. Contraction of spleen
5. Conversion of glycogen into glucose in liver
6. Sweating
7. Dilation of airways
8. Decrease in digestive activities
9. Water retention and elevated blood pressure

**Resistance reaction**:
1. Lipolysis
2. Gluconeogenesis
3. Protein catabolism
4. Sensitized blood vessels
5. Reduced inflammation
6. Increased use of glucose to produce ATP

Key terms used in the diagram include:
- CRH = Corticotropin-releasing hormone
- ACTH = Adrenocorticotropic hormone
- GHRH = Growth hormone-releasing hormone
- hGH = Human growth hormone
- TRH = Thyrotropin-releasing hormone
- TSH = Thyroid-stimulating hormone

Epinephrine and norepinephrine supplement and prolong the fight-or-flight responses.
THE CORTISOL PATHWAY

Hypothalamus
CRH stimulates release of corticotropin (ACTH)
Anterior pituitary
Corticotropin (ACTH)
Corticotropin-releasing hormone (CRH)
Adrenal cortex
Cortisol

Elevated cortisol inhibits release of CRH by hypothalamic neurosecretory cells
Elevated cortisol inhibits release of corticotropin by anterior pituitary corticotrophs

RIGHT ADRENAL GLAND
Right renal artery
Right renal vein
Superior mesenteric artery
Abdominal aorta
 Inferior vena cava
 (a) Anterior view
THE NERVOUS SYSTEM OVERVIEW

Central Nervous System (CNS)
- Brain
  - Receives and processes sensory information, initiates responses, stores, memories, generates thoughts and emotions
- Spinal cord
  - Conducts signals to and from the brain, controls reflex activities

Peripheral Nervous System (PNS)
- Motor Neurons
  - CNS to muscles and glands
- Sensory Neurons
  - Sensory organs to CNS

Somatic Nervous System
- Controls voluntary movements

Autonomic Nervous System
- Controls involuntary responses
  - Sympathetic Division
    - "Fight or Flight"
  - Parasympathetic Division
    - "Rest or Digest"
The Spectrum from Mood and Anxiety Disorders to Painful Functional Somatic Symptoms

- anxiety and mood disorders
  - anxiety disorder subtypes
  - PTSD
  - GAD
  - MDD

- mixed
  - worry
  - fatigue
  - sleep
  - cognition

- painful physical symptoms of depression/anxiety
- chronic widespread pain
- fibromyalgia
- shingles
- diabetic peripheral neuropathic pain
- osteoarthritis
- low back pain
- chronic neuropathic pain syndromes

Stahl, Stephen M. "Stahl's Essential Psychopharmacology: Neuroscientific Basis and Practical Applications". Figure 10-6
One or more somatic symptoms that are distressing or result in significant disruption

Excessive thoughts, feeling or behaviours related to somatic symptoms or associated health concerns

- Disproportionate and persistent thoughts about the seriousness of symptoms
- Persistently high level of anxiety about health/symptoms
- Excessive time and energy devoted to these symptoms/health concerns

The state of being symptomatic is persistent
ALLOSTATIC LOAD

ALLOSTATIC LOAD

- Perception of stress is influenced by one's experiences, genetics, and behavior.
- Model transcends any one organ system
- When the brain perceives stress, physiologic and behavioral responses are initiated leading to allostasis and adaptation.
- Over time, allostatic load can accumulate, and the overexposure to neural, endocrine, and immune stress mediators can have adverse effects on various organ systems
- The model provides a basis for understanding connections among the etiology of systemic illnesses such as CVD and mental illnesses such as depression and the condition of hostility.

ALLOSTATIC OVERLOAD: WEAR AND TEAR ON THE BODY DUE TO CHRONIC STRESS

- Decreased immune functions
- Hypertension
- Atherosclerosis
- Increase platelet reactivity
- Abdominal obesity
- Bone demineralization
- Atrophy of neurons in hippocampus and prefrontal cortex
- Increased activity of amygdala
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STRESS EFFECTS

- Stress
  - Metabolic Effects
    - Cardiovascular
    - Immune
  - Mechanical Effects
    - Gastrointestinal
    - Mental Health
    - Musculoskeletal
    - Work-related musculoskeletal disorders
STRESS COMMON SYMPTOMS: ACUTE

• Fast heartbeat (tachycardia)
• Headache
• Stiff neck and/or tight shoulders
• Back pain
• Fast breathing
• Sweating, and sweaty palms
• Upset stomach, nausea, or diarrhea
STRESS COMMON SYMPTOMS: CHRONIC

Immune system

- More likely to get sick more often
- May aggravate existing chronic illnesses such as AIDS, cancer etc.

Cardiovascular

- Linked to high blood pressure, abnormal heartbeat (arrhythmia), blood clots, and hardening of the arteries (atherosclerosis)
- Stress is also linked to coronary artery disease, heart attack, and heart failure

Muscular

- Constant tension from stress can lead to neck, shoulder, and low back pain
- Stress may make rheumatoid arthritis worse
STRESS COMMON SYMPTOMS: CHRONIC

Gastrointestinal

• May aggravate conditions such as gastro esophageal reflux disease (GERD), peptic ulcer disease, or irritable bowel syndrome

Reproductive organs

• Low fertility, erection problems, problems during pregnancy, and painful menstrual periods.

Respiratory

• Stress can exacerbate symptoms of asthma and chronic obstructive pulmonary disease (COPD)

Skin

• Conditions such as acne and psoriasis are made worse by stress

Psychiatric

• An extreme reaction to stress is a panic attack
• PTSD, depression and other anxiety disorders
## Physiological Effects of Stress on the MSK System

<table>
<thead>
<tr>
<th>Physiological change</th>
<th>How MSK Risk is Increased</th>
</tr>
</thead>
<tbody>
<tr>
<td>↑ blood pressure</td>
<td>↑ pressure in the joint specifically on tendons, ligaments, and nerves (carpal tunnel)</td>
</tr>
<tr>
<td>↑ fluid pressure</td>
<td>↑ pressure may be placed in joints, and on tendons, ligaments, and nerves</td>
</tr>
<tr>
<td>↓ Growth functions</td>
<td>↓ Collagen means ↓ ability for the body to heal or recover after performing work functions</td>
</tr>
<tr>
<td>↓ Sensitivity to pain</td>
<td>Workers may work beyond and above their body's physical capacity</td>
</tr>
<tr>
<td>Dilation of pupils</td>
<td>↑ Increased sensitivity to light</td>
</tr>
<tr>
<td>↑ Muscle tension</td>
<td>↑ pressure on and around joints, tendons, ligaments, nerves, and may cause excessive use of force during certain activities and movements</td>
</tr>
<tr>
<td></td>
<td>Worker may overburden their musculoskeletal system (lift more, work faster, etc.)</td>
</tr>
</tbody>
</table>

[http://www.ccohs.ca/oshanswers/psychosocial/musculoskeletal.html](http://www.ccohs.ca/oshanswers/psychosocial/musculoskeletal.html)
Many Alternate Names

- Repetitive motion injuries
- Repetitive strain injuries
- Cumulative trauma disorders
- Occupational cervicobrachial disorders
- Overuse syndrome
- Regional musculoskeletal disorders
- Soft tissue disorders
Normal motions (bending, straightening, gripping etc.) can become hazardous with:

- Continual repetition
- Forceful manner of motion
- The speed of the movements
- The lack of time for recovery between movements

Risk Factors:

- Fixed or constrained body positions
- Continual repetition of movements
- Force concentrated on small parts of the body, such as the hand or wrist
- A pace of work that does not allow sufficient recovery between movements
1. **Muscle injury**

- Muscle contraction that lasts a long time reduces blood flow
- Accumulation of waste materials causes pain with prolonged time of contraction
2. Tendon injury
   a. With sheaths
      Inadequate lubrication system leads to inflammation, fibrous tissue formation and decreased ROM
   b. Without sheaths
      Tensing of tendon leads to tears, inflammation of both tendon (tendonitis) and bursa (bursitis)
TENDINITIS AND TENDINOSIS

Tendinitis vs. tendinosis

Treatment

- Elimination of repetitive task until full recovery
- Physical therapy
  - Stretches and Exercises
- Medical treatment
  - Anti-inflammatory pills or injections

Outcome

- Variable; usually months for chronic problems
3. Nerve injury

- With repetitive motions and awkward postures, the tissues surrounding nerves become swollen, and squeeze or compress nerves.

- Compression of a nerve causes muscle weakness, sensations of "pins and needles" and numbness. Dryness of skin, and poor circulation to the extremities, may also occur.
WMSD’S: SYMPTOMS

Early stage
- Aching and tiredness of the affected limb occur during the work shift
- Symptoms disappear at night and during days off work
- No reduction of work performance.

Intermediate stage
- Aching and tiredness occur early in the work shift and persist at night
- Reduced capacity for repetitive work

Late stage
- Aching, fatigue, and weakness persist at rest
- Inability to sleep and to perform light duties
WMSD’S: TREATMENT

A. Restriction of movement
   • Often requires work restrictions or transfer to different job
   • Splints should not be used for mechanical support in an occupational setting, rather redesign job to minimize load on the joint

B. Application of heat or cold
   • Cold reduces pain and swelling and is recommended for injuries and inflammations
   • Ice is not recommended in case of muscle pain (spasm) - only immediately after an injury occurred, and only for few days.
   • Heat for muscle pain relief, not for injuries with significant inflammation and swelling

C. Exercise
   • Stretching promotes circulation and reduces muscle tension

D. Medication and surgery
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TECHNOLOGY’S IMPACT

- 78% of Canadians households have a cell phone
- Technology is the preferred method of communication among many age groups
- Heavy reliance on social media to receive information
- Provides opportunity to receive just in time communications
- Written communications can be misinterpreted
- Stress and anxiety due to “just in time”
- Inability to disconnect
EMAIL STRESS

Cortisol response occurred for participants during email use, which both supports blood pressure and heart rate readings, and is a key display of participants’ sustained or raised levels of stress.
EMAIL STRESS ACTIVITIES

- Link between email and stress
- Employees were more prone to increased stress during information gathering (reading) and sharing (sending) activities
- Less susceptible to stress during information management and retrieval activities (finding and filing email messages)
- Prior studies showed that users who file are less likely to suffer from stress than those who do not file
- Lack of clarity comparing email to other means of communication
JOB STRESS: SIGNS

- Headaches
- Trouble sleeping
- Problems concentrating
- Short temper
- Upset stomach
- Job dissatisfaction and low morale
JOB STRESS: CAUSES

• Lack of control
• Increased responsibility
• Job satisfaction and performance
• Uncertainty about work roles
• Poor communication
• Lack of support
• Unpleasant or dangerous physical conditions, such as crowding, noise, or ergonomic problems
The Resiliency Hierarchy of Needs
Importance of problem solving

• Better functioning
• More satisfying relationships with friends, family and coworkers
• Higher self esteem
• Higher life satisfaction

If problems are difficult/complex

• Can create stress and impact our health
• Coping can be done by doing what we have done in the past
• Solution though must work. If it doesn’t the problem wont be resolved

What helps in fixing a problem that is difficult or complex?
PROBLEM SOLVING SKILLS

Building Relationships – Strong relationships

• Listening Skills
• Realizing conflict is normal part of relations
• Spend with those who inspire you

Competence – building competence

• Ask for training or support when you need it
• Don’t be afraid to ask questions
• Take advantage of informal and formal learning opportunities – networks, charities, webinars
• Talk to people who know more than you do
How will I know when I get there?

• Specific
• Measurable
• Attainable
• Realistic
• Time limited

Look at possible solutions

Decide on best solution
What is the difference between self-esteem and confidence?

We can be confident about our abilities to perform a task or a job but we can lack self-esteem.
ABILITY TO TAKE ACTION

Resiliency dependent on ability to take action

Two things affect ability to take action

1. Motivation
   - Awareness and reason

2. Perspectives
   - Two views which often times can be extreme
ABILITY TO TAKE ACTION

Optimism

- Keep a list of things that help you cope in difficult situations
- Stay connected to people who can help you cope
- Make time for self
- Break problems down into smaller parts
- Make a plan to change things you have power and influence to change
- Celebrate success as change happens
What is a teachable moment?
What is a teachable moment?

• There is a real understanding of the actions/activity that affect an outcome

• Ability to sustain that realization in managing our health and wellbeing
A successful return to work is not the day the employee returns to workplace.

Successful return to work is when an employee returns and is able to sustain level of engagement in workplace.

- Discussion with employee, manager and peers about return to work
- Process for checking in
- Health coaching or other programs to support employee
- Transformational Leadership
RESILIENCY ISSUES IN WORKPLACE

- Begin a dialogue on the importance of understanding stress and resiliency of our coworkers
- Create an understanding of thresholds of resiliency of our staff
- Create ways to ensure we recognize and support those who are not as resilient